

U.S. Army Field Artillery Relevance on the Modern Battlefield

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EXECUTIVE SUMMARY

Title: U.S. Army Field Artillery Relevance on the Modern Battlefield

Thesis: Military operations in support of the Global War on Terror, and particularly those in Iraq, provide valuable insight into the relevance of the U.S. Army field artillery's relevance on the modern battlefield and its required capabilities.

Discussion: As the US Military embarked upon the Global War on Terror, the US Army Field Artillery found itself bombarded by questions of its continued relevance. Artillery was noticeably absent from Operation Anaconda in Afghanistan, the Department of Defense cancelled the Crusader Howitzer Program, and pundits questioned whether the artillery was still relevant. As the dust settled from these events, the Army was deeply involved in Operation Iraqi Freedom. The force structure in Iraq was almost half as small as that for Operation Desert Storm and the Army's artillery to maneuver force ratios were the smallest since the late-19th Century. The service was trading mass for speed and agility. While an important contributor to the Army's success in the major combat phase of Operation Iraqi Freedom, the artillery was not without its shortcomings.

Conclusions: The artillery must take a hard look at these trends and shape the future artillery force into one that is agile in its deployability and mobility while complementing the effects of other joint fires assets. It is impossible to predict with absolute certainty the artillery's relevance in future conflicts. **However, operations in Afghanistan and Iraq have proven that the key to success on the modern battlefield is not any one means of fire support but the successful integration of the full spectrum of lethal and non-lethal joint fires.** While the future remains to be seen, US Army Field Artillery can best posture itself for relevance by consistently improving its contribution to the joint fire support team in support of combined arms operations.

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PREFACE

I began research on this paper in order to provide some insight into the U.S. Army field artillery's role on the modern battlefield. A decade of peacekeeping operations around the globe, after Operation Desert Storm in 1991, found the field artillery conducting presence patrols and manning checkpoints rather than delivering cannon, rocket, or missile fires in support of combat operations. Additionally, post-9/11 operations in Afghanistan in 2001 saw field artillery units on the sidelines as U.S. forces engaged in combat operations. My research focused on exploring the field artillery's role on the modern battlefield through an analysis of the artillery's historical roles and missions contrasted with present-day operational needs. At the heart of my research are first-person accounts from commanders and staff officers that participated in Operation Enduring Freedom (October 2001 – Present) as well as Operation Iraqi Freedom (March 2003 – Present). I supplemented these accounts with secondary analyses of force structure and “big picture” perspectives of post-9/11 military operations from military officials, policy experts, and historians. All of these sources guided my critical analysis of the field artillery's continued relevance and corresponding recommendations for change. I would like to express my gratitude to the commanders and staff officers of the 3rd Infantry Division and 101st Airborne Division whose first-person accounts of combat operations made this paper possible and to Lieutenant Colonel Bill Bennett and Doctor Don Bittner for their invaluable mentorship as my faculty advisors. Finally, I would like to especially thank my wife Amy for her support and untiring patience through all of the research, writing, and editing of this document over the last eight months.

CHAPTER 1

BACKGROUND

INTRODUCTION

As the U.S. military embarked upon the Global War on Terror, the U.S. Army field artillery found itself bombarded by questions pertaining to its relevance. While proudly earning the title “King of Battle” for its vital contributions in every major operation since the Revolutionary War, the artillery’s role in military operations seemed to be diminishing upon the conclusion of the Cold War. While critical to the successful maneuver of Cold War legacy ground formations in Operation Desert Storm, the field artillery’s relevance seemed to be in decline in the ensuing ten years. The U.S. Army deployed artillery units to support stability operations in Somalia, Haiti, Bosnia, and Kosovo. The artillerymen contributed much in the way of manpower, transportation resources, targeting, and deterrence over the course of these operations. However, these new roles were not exactly in keeping with the field artillery’s mission “to destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fires and to integrate all fires into combined arms operations.”¹ The field artillery’s core competency of delivering these cannon, rocket, and missile fires was mostly limited to firing illumination rounds in support of presence patrols. Whether the 105mm howitzers of the Army’s light forces or the 155mm howitzers and Multiple Launch Rocket Systems (MLRS) of the Army’s heavy forces, the decade of the 1990’s was one of relative silence

¹ U.S. Army Field Artillery School, “Field Artillery Mission,” *sill-www.army.mil*, <www./pao/mission.htm> January 2004.

for the field artillery. The field artillery's post-Operation Desert Storm dormancy provided fertile ground for questions regarding its relevance.

A STRUGGLE FOR RELEVANCE

The military's transition to a wartime footing after 11 September 2001 raised questions of the field artillery's relevance. Soon after, the Army deployed forces to Afghanistan in order to bring the fight to the Taliban and Al-Qaeda. Based upon the speed with which President George W. Bush and Secretary of Defense Donald H. Rumsfeld wanted to bring forces to bear in the austere and landlocked environs of Afghanistan, the deployed forces were tailored to trade mass and overwhelming firepower for flexibility and agility. Notably absent from the deployment manifests were field artillery weapon systems.

At the same time, some within the Army were questioning the artillery's ability to provide effective close support to maneuver operations.² Based upon the refinement of deep battle doctrine using lessons learned from Operation Desert Storm, the field artillery had developed tactics, techniques, and procedures (TTP) to complement the new Army Tactical Missile System (ATACMS) that made its debut in Desert Storm and was capable of ranges beyond 150 Kilometers (Km). With this new munition, the field artillery could now accurately strike, "at enemy forces that were not yet engaged and destroy enemy capabilities that would have an immediate impact on the close battle."³ The shift in the field artillery's conceptual focus to such deep strike interdiction missions caused some to

² LTC Robert R. Leonhard, "Classical Fire Support vs. Parallel Fires," *Army Magazine* 51, no.4, April 2001, 47-50.

³ Boyd L. Dastrup, *Modernizing the King of Battle* (Fort Sill, OK: United States Army Field Artillery Center and School, 1994), 23.

call into question the field artillery's dedication to its traditional role of supporting maneuver forces in the close fight.



Figure 1-1. M39 ATACMS⁴

Finally, in May 2002 the Department of Defense canceled the Army's Crusader cannon system, a system that only a few months before had been termed a "critical delivery system" by Army leadership.⁵ The loss of this "next generation" howitzer meant to replace systems outperformed and outranged by the current artillery forces of allies and potential foes alike, only posed additional questions with regards to the field artillery's future.

OPERATION ENDURING FREEDOM

In March 2002, the United States, with assistance from coalition partners, commenced Operation Anaconda in Afghanistan. The mission: to destroy massed Taliban and Al-Qaeda forces in Afghanistan's Sha-e-Kot Valley. MG Franklin Hagenback, commander of the 10th Mountain Division and CJTF Mountain in Anaconda,

⁴ White Sands Missile Range Museum, www.wsmr-history.org, <www.wsmr-history.org/AtacmsAction3.htm>

⁵ MG Toney Stricklin, "Field Artillery: Relevant, Trained, and Ready...Two Years Later," *Field Artillery* (July-August 2001): 4.

remarked that he did not even consider bringing the unit's 105 mm howitzers because they could accomplish the mission without them.⁶ In retrospect, he felt particularly confident in this decision given the limited rotary winged lift assets, significant lift limitations at high altitude, and the rough terrain that would have made re-positioning towed howitzers extremely difficult. Instead, units from the 101st Airborne Division and the 10th Mountain Division relied upon close air support (CAS) for heavy firepower and mortars for immediate and mobile fire support.

Operation Anaconda was significant because the American forces accomplished their mission in the largest engagement of Operation Enduring Freedom to-date by relying upon fire support assets other than the field artillery. The mortars provided an all-weather, responsive asset that was light enough to transport by helicopter in high elevations, had a very small footprint with regards to strategic lift, and was organic to the infantry units employed in the fight. The CAS aircraft were self-deployable, complemented the mortar's range limitations, and in-turn their limited responsiveness was complemented by the mortar's immediate responsiveness. Even the lightest field artillery howitzers would have required additional strategic lift assets to transport equipment and personnel from the U.S. to Afghanistan. Once in theater, they would have required additional CH-47 helicopters for transport. Such dedicated lift was unavailable given the premium placed on tempo and agility from the operation's beginning. While possibly an aberration of terrain and initial-entry lift requirements, the artillery's absence during Anaconda only added to a growing list of Army operations since Operation Desert Storm that did not employ its fires.

⁶ MG Franklin L. Hagenback, "Afghanistan: Fire Support for Operation Anaconda," interview by Robert H. McElroy and Patricia Slayden Hollis in *Field Artillery* (September-October 2002): 8.

BACKGROUND

During the ten years between Desert Storm and the Global War on Terror, the field artillery focused much of its training and doctrine development upon shaping operations several hundred kilometers beyond the FLOT. Besides counterfire, an increasingly important mission for general support artillery was the attack of high payoff targets such as SCUD launchers, suppression of enemy air defense (SEAD) for close air support, and SEAD for attack aviation units deep into the battlespace. The ATACMS munition first employed during Desert Storm provided range and accuracy capabilities superior to its predecessor the Lance missile system opening the deep battlespace to tactical commanders for the first time.

While the field artillery was developing new variants of ATACMS and the tactics, techniques, and procedures to employ them, many in the Army thought this new deep focus came at the cost of support to maneuver forces engaged in the close battle. Indicative of this suspicion was an article written in 2001 by a retired infantry officer. LTC(Retired) Robert Leonhard's article on artillery support summed up many in the maneuver community's misgivings regarding the field artillery's dedication to the close-fight. LTC Leonhard wrote that the artillery could no longer integrate fires with infantry and armor units because of a parallel fire support system that only supports the attack of an artillery-devised High Payoff Target List (HPTL). This parallel fires system is in direct contravention of fire support's classical role of providing fires to support the maneuver commander's needs. The result of this parallel fires system is fire support unresponsive to the fluid targeting requirements of maneuver warfare in order to place "the main-effort unit into the enemy's rear where it can cause confusion, disruption, and

defeat.” Furthermore, Leonhard writes, “Our doctrine no longer emphasizes close coordination between task forces and fires, and the technology and the tactics, techniques, and procedures we employ in the field absolutely banish the maneuver commander from the now-mysterious world of fire support.”⁷ Leonhard does not deny the importance of the field artillery to combined arms operations, but he decries the lack of a “customer support” ethos in the field artillery with the dangerous effect of denying maneuver commanders the synchronized fires needed to successfully complete their mission. Leonhard’s article articulated what many in the Army viewed as fact.

CRUSADER

Secretary of Defense Donald Rumsfeld’s decision to cancel the Army’s Crusader howitzer program soon after Operation Anaconda in May 2002 further called into question the field artillery’s role in the current and future operating environments. In announcing the cancellation, Rumsfeld referred to the Crusader as a Cold-War relic designed for fighting large Soviet armored formations on the plains of Northern Europe; hence, it was of dubious value in the rapidly changing non-linear battlefields of the War on Terror.⁸

The Defense Department reasoned that the risk associated with Crusader’s cancellation could be mitigated by the development of precision munitions for current cannon systems. However, it went against the Congressional testimony of Army Chief of Staff General Eric Shinseki, who stated that precision guided weapons and close air support may be more accurate, “[but] if you have imprecise locations or if you just know

⁷ Leonhard, “Classical Fire Support vs. Parallel Fires,” 48.

⁸ Scott Shuger, “Outgunned: What the Crusader Cancellation Really Means to the Army,” 23 May 2002, *MSN.Com*, URL: <slate.msn.com/id/2066158/>, November 2003.

there's enemy force out there, but you don't have them accurately located, precision doesn't help you much.”⁹ In spite of this and other testimony by senior Army officials, another vote of no confidence was cast for the Army’s view of modern warfare and correspondingly the field artillery’s place on future battlefields.

CONCLUSION

Looking through the combined lens of Operation Anaconda, the questions of close support, and the Crusader cancellation, the field artillery appeared to be on the verge of irrelevance just as the Global War on Terror commenced. Make no mistake, the War on Terror introduced challenges throughout the U.S. Army as it transitioned from a heavy force without a peer competitor structured to fight symmetric foes on linear battlefields to a lighter and more expeditionary force. The challenges appeared especially daunting for the field artillery as special operations forces and light infantry units took the fight to the terrorists using fire support provided by air launched precision munitions and mortars rather than cannon, rocket, or missile fires. Additionally, the Department of Defense cancelled the field artillery’s one and only new delivery system with no identified replacement.

In March 2003 the U.S. military embarked on the largest operation to-date in the post-9/11 era, Operation Iraqi Freedom (OIF). Due to Iraq’s large standing army, ability to employ chemical weapons, and numerous urban areas Iraq presented a difficult test of the military’s emphasis on tempo and agility that had worked so well in Afghanistan. The operation would further prove a test of the U.S. Army’s field artillery forces and their ability to support rapid and decisive warfare.

⁹ Shuger, “Outgunned: What the Crusader Cancellation Really Means to the Army.”

CHAPTER 2

ARTILLERY IN OPERATION IRAQI FREEDOM

INTRODUCTION

The Army deployed to Operation Iraqi Freedom with a proportion of artillery to maneuver forces lower than that of any major campaign since the Spanish American War.¹⁰ In Operation Desert Storm, a committed division could expect to receive one or two reinforcing brigades of artillery; however, in Operation Iraqi Freedom the 101st Airborne Division (Air Assault) and 3rd Infantry Division (Mechanized) went into battle with only their organic division artilleries. This lack of additional artillery support was significant because it forced the weighting of a division's main effort maneuver brigade with a reinforcing artillery battalion drawn from a supporting effort maneuver brigade. While often drawn from a brigade in reserve, the non-linear nature of the war meant that every brigade was constantly in contact and, at times, without artillery in direct support.¹¹ This put artillery fires at a premium for brigade commanders because, while extremely effective during the conflict, mortars were limited in their range capabilities and close air support was degraded in adverse weather conditions.

Throughout Iraqi Freedom commanders relied on the field artillery to provide counterfire in order to destroy enemy cannon and rocket systems. These counterfire operations were extremely important in setting the conditions for the rapid attack of U.S. forces towards Baghdad. The Iraqi artillery outranged and outnumbered the U.S. artillery

¹⁰ MG(R) Robert Scales, "Artillery's Failings in the Iraq War: United States Must Focus on Range and Precision," *Armed Forces Journal* (November 2003): 44.

¹¹ COL Daniel Allyn, Commander of 3rd Brigade 3rd Infantry Division in Operation Iraqi Freedom, interview by the author, 10 December 2003.

and even uncoordinated harassing fires could adversely impact the operation by slowing down the tempo of U.S. forces. The U.S. Army also relied on the artillery for close support in adverse weather conditions such as the 24-26 March 2003 “mother of all” sandstorms. The Iraqi Fedayeen mounted countless attacks during this period due to the limitations it placed on coalition airpower; however, all-weather artillery and mortar fires delivered “danger close” to friendly positions complemented direct fire weapon systems and prevented many 3rd Infantry Division units from being overrun.¹²

Seen through the eyes of maneuver and field artillery commanders from the 101st Airborne and 3rd Infantry Divisions, the field artillery was absolutely relevant because it provided timely and accurate fires and integrated all available fire support systems into combined arms operations. Fire support integration was essential in every attack made by the maneuver units and set the conditions for its domination in the direct-fire fight.¹³ Field artillery units did provide some long-range shaping fires during the conflict; however, at the tactical level these primarily consisted of counterfire missions that had as their sole purpose maintaining freedom of maneuver for their supported units. Everything the field artillery did with respect to artillery fires and fire support in general was joined at the hip with the maneuver commander’s and their intent. Hence, the field artillery played its traditional role- unlike in Afghanistan.

Field artillerymen accomplished this effective support during Operation Iraqi Freedom because the ethos of artillery as a supporting arm to maneuver units is ingrained in Army doctrine, new equipment must allow artillerymen to mesh much more seamlessly into maneuver formations, and because the artillery was flexible in its

¹² Scales, “Artillery’s Failings in the Iraq War: United States Must Focus on Range and Precision,” 46.

¹³ Allyn, interview by the author.

adaptation to a very complex environment. However, it was the art of fire support that served as the thread to tie all of these factors together. Without artillerymen and maneuver commanders and staffs assuming the responsibility for fire support as a coherent team, the best doctrine, equipment, and even flexibility will not amount to much. Army forces during Iraqi Freedom did work as an effective fire support team, which made the field artillery relevant, and in fact critical, to decisive operations.

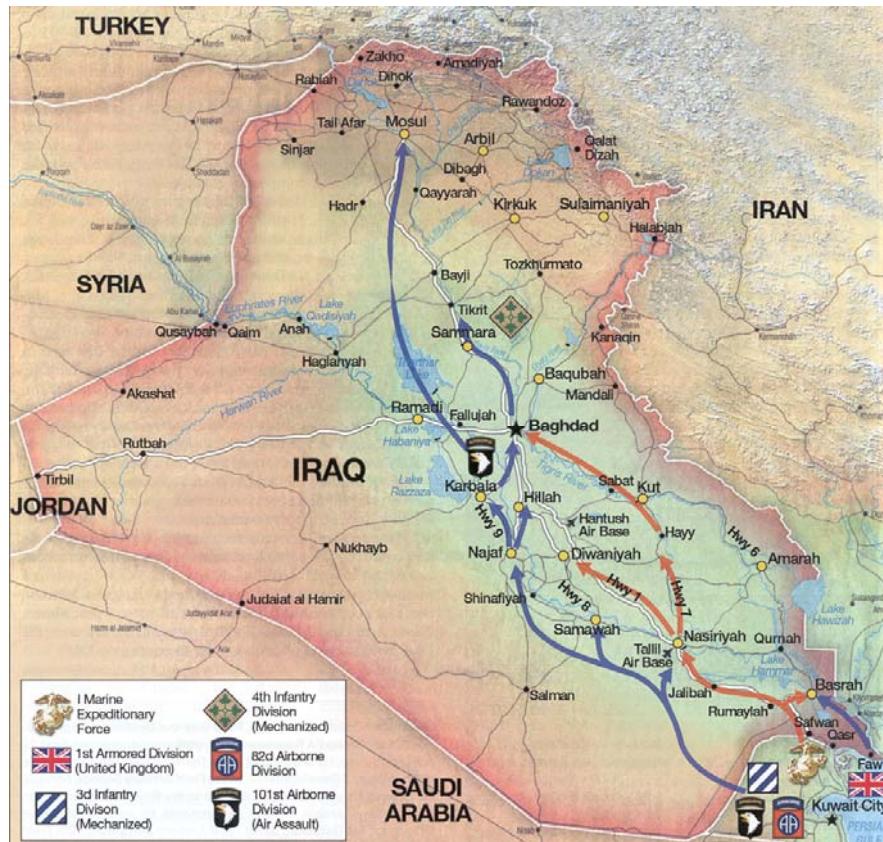


Figure 2-1. OIF Area of Operations and Combat Units¹⁴

¹⁴ “Major Combat Units in Operation Iraqi Freedom,” *Field Artillery* 8, no. 5 (September-October 2003): 3.

ESSENTIAL FIRE SUPPORT TASKS

Essential fire support task (EFST) doctrine ensured that there was not a parallel system of fires but rather one system that supported the needs of the maneuver commander. While initially developed as a tool in support of the military decision making process, EFSTs proved themselves more valuable as a philosophy of support than as paragraphs in an operations order. The Field Artillery School at Fort Sill, Oklahoma defines an EFST as, “a task for fire support to accomplish that is required to support a combined arms operation...failure to achieve an EFST may require the (maneuver) commander to alter his tactical or operational plan.”¹⁵ The definition alone makes it clear that fires are to be planned and executed by a combined arms team in accordance with the maneuver commander’s intent and the unit’s mission.

The EFST doctrine, first put forth by Fort Sill in a May 1998 white paper, provided a fire support focus to the field artillery that paid great dividends during Operation Iraqi Freedom. One example illustrates this: in the 3rd Infantry Division’s 3rd Brigade Combat Team (BCT), the brigade commander personally reviewed and approved EFSTs developed by the fire support coordinator (FSCOORD) in conjunction with the rest of the brigade staff and with additional input from subordinate task force commanders.¹⁶ The EFSTs focused the artillery on providing fires at the right place and right time to support critical maneuver tasks such as bridge seizures, and they focused maneuver units by tasking them to get a forward observer in position to observe these

¹⁵ Fire Support and Combined Arms Operations Department (FSCAOD), *Essential Fire Support Task (EFST)* (Ft Sill, OK: U.S. Army Field Artillery School Pre-Command Course Slides, April 2001).

¹⁶ LTC Doug Harding, Commander of 1st Battalion, 10th Field Artillery, 3rd Infantry Division in Operation Iraqi Freedom, telephone interview by the author, 2 December 2003.

critical targets.¹⁷ The significance of this cannot be understated because it not only concentrated the artillery's planning and execution on close maneuver support, but it also helped to bring the artillery and maneuver arms together as a fire support team dependent upon one another for success.

As previously stated, it was not the interjection of a few EFSTs into operations orders that led to the artillery's success during Operation Iraqi Freedom. In fact, one artillery battalion commander from the 101st Airborne Division commented that the "lengthy EFST process [consistently trained at home-station and the combat training centers]...we found to be of little or no use."¹⁸ Instead, it was the support mindset amongst artillerymen, the shouldering of responsibility for fire support tasks by maneuver commanders, and the fusion of these two concepts into a focused fire support team that resulted in success for both. Artillerymen were not tied to supporting a high payoff target list as a product of the planning process; rather, they provided fires with the agility required to support maneuver units during operations in a fast-paced non-linear environment.

M7 BRADLEY FIRE SUPPORT TEAM VEHICLE

The M7 Bradley Fire Support Team (BFIST) vehicle was yet another enabler of the artillery's ability to deliver critical fire support for maneuver. The M7 BFIST provided a capability sorely missing during Operation Desert Storm when the Army's heavy units employed the M981 Fire Support Team Vehicle (FIST-V) vehicle whose

¹⁷ LTC Ernest Marcone, Commander of 3rd Battalion, 69th Armor, 3rd Infantry Division in Operation Iraqi Freedom, telephone interview by the author, 12 December 2003.

¹⁸ LTC Henry W. Bennett, Commander of 1st Battalion, 320th Field Artillery, 101st Airborne Division in Operation Iraqi Freedom, interview by LTC Pitts, U.S. Army Operation Iraqi Freedom Study Group (OIFSG), 22 May 2003.

engine could not maintain pace with maneuver forces, was not survivable against even small arms fire, and provided a very limited targeting/C2 capability. Conversely, the BFIST during OIF maintained operational tempo (OPTEMPO) with even the fastest maneuver systems, was survivable, and could provide precise grid coordinates within 50 meters at ranges exceeding 8,000 meters to supporting fire delivery units.¹⁹



Figure 2-2. M7 BFIST²⁰

These new capabilities allowed the BFIST to support maneuver formations from the front, to include advance-guard maneuver companies. Fire supporters could now fight their way to observation posts with the 25 mm chain gun and achieve first round fire for effect at all times with their inherent targeting accuracy.²¹ During one engagement a “BFIST took out several trucks and multiple troops” and at another point in the battle took up positions with the lead elements of its Task Force.²² The BFIST proved itself invaluable to maneuver commanders as a sensor platform able to maintain OPTEMPO and survive on the non-linear battlefield. The BFIST’s survivability, OPTEMPO, and

¹⁹ Scott R. Gourley, “M7 Bradley Fire Support Team Vehicle,” *Army Magazine*, July 2002, 2; LTC Harding telephone interview.

²⁰ United Defense Inc., www.uniteddefense.com, <www.uniteddefense.com/pr/gra_bradm7.htm>

²¹ COL David Perkins, Commander of 2nd Brigade, 3rd Infantry Division in Operation Iraqi Freedom, interview by the author, 16 December 2003; Jeffrey Sanderson, Commander of 2nd Battalion, 69th Armor, 3rd Infantry Division in Operation Iraqi Freedom, telephone interview by the author, 3 December 2003.

²² CPT Lee, Commander B Company, 3rd Battalion, 69th Armor, 3rd Infantry Division in Operation Iraqi Freedom, interview by Master Sergeant West of the OIFSG, 15 May 2003.

targeting accuracy improvements provided essential fire support to maneuver commanders over extended distances and at rapid speeds during Operation Iraqi Freedom. In such a fluid environment, maneuver commanders required immediately responsive fires and the BFIST delivered.

M109A6 PALADIN INTEGRATION

Integration of M109A6 Paladin howitzers into maneuver formations was another hallmark of OIF operations that allowed for timely and accurate fires in support of maneuver. During operations, Paladin batteries were often integrated into lead maneuver formations. This forward positioning of artillery allowed the Paladins to range targets in support of the close fight at all times. Because the 3rd Infantry Division unit fought the war primarily in combat column formations along high-speed avenues of approach, a single maneuver task force could be tens of kilometers in length.²³ Placing the artillery at the rear of these formations was not an option due to the range capabilities that would have been lost and the premium placed on each tube due to a lack of reinforcing artillery.

One example of this close integration was in the 3rd Battalion, 69th Armor of the 3rd Infantry Division whose commander commented, “The way I fought the artillery is I had the lead battery right behind the lead company.”²⁴ His supporting artillery battalion commander underscored the importance of his artillery’s integration with maneuver units by stating, “If (I) would not have had firing batteries directly behind the lead maneuver

²³ LTC Jeffrey Sanderson, Commander Task Force 2-69 Armor; 3rd Infantry Division in Operation Iraqi Freedom, telephone interview by the author, 3 December 2003.

²⁴ LTC Earnest Marcone, Commander of 3rd Battalion, 69th Armor, 3rd Infantry Division in Operation Iraqi Freedom, interview by COL(R) Fontenot and LTC Degen of the OIFSG, 22 October 2003.

company they would have had issues with range in supporting maneuver.”²⁵ The task force conducted maneuver rehearsals with the artillery units so the Paladins could complement the task force scheme of maneuver and conduct battle drills in accordance with task force standard operating procedures (SOP). These rehearsals paid tremendous dividends at each of the battalion’s five bridge seizures, to include the battalion’s successful seizure of a key bridgehead across the Euphrates on 2 April 2003 at Objective Peach. Because of their forward positioning and understanding of the scheme of maneuver, the Paladins were able to provide critical obscuration and suppression in support of the bridge seizures while concurrently firing crew-served weapons in defense of the battery and task force positions.²⁶



Figure 2-3. 3rd Infantry Division Artillery M109A6 Paladin in Iraq²⁷

The image of a field artillery battery simultaneously providing direct and indirect fires is a powerful symbol of the challenges faced by the combined arms team in Iraq and in the challenges to be faced in future conflicts as well. Gone are the days of massed

²⁵ LTC Lackey, Commander of 1st Battalion, 41st Field Artillery, 3rd ID in Operation Iraqi Freedom, interview by LTC Pitts of the OIFSG, 18 May 2003.

²⁶ Marcone, telephone interview by the author.

²⁷ Silver State News Service, www.silverstatenews.com, <www.silverstatenews.com/newssections/WarOnTerror/>

linear formations with several brigades of reinforcing artillery. What are needed are lighter more agile units conducting operations faster than their adversary's can react. With this "lightening of the load", every weapon system must count. Much like the BFIST, the Paladin made artillery fires count because it helped to facilitate a responsive fire support team amongst artillerymen and their supported maneuver units.

TIMELINESS

The field artillery provided timely artillery fires to maneuver forces during Operation Iraqi Freedom due to extremely responsive clearance of fires and mission processing procedures amongst maneuver and artillery units. OIF's high-tempo and non-linear battlefield created a complex environment for the delivery of fires. Units were moving at such a rapid pace that, at times, formal boundaries were almost impossible to emplace and fires to the flank of a movement called by one company would sometimes be observed by the trail company. In order to prevent fratricide, situational awareness of friendly unit locations was critical as well as the close cooperation between artillery and maneuver units in the clearance process.

Prior to the start of hostilities, many maneuver commanders were concerned with the timeliness of artillery fires based upon their experiences at the Army's combat training centers (CTC) at Fort Polk, Louisiana; Fort Irwin, California; and Hohenfels, Germany where responsive fires are often non-existent on a much slower paced battlefield where linear operations are the norm.²⁸ An artillery battalion commander in the 3rd Infantry Division described the artillery's training dilemma:

The brigade commander [based upon previous combat experience] always believed in artillery, but the guys you have to sell are the ones who

²⁸ Perkins, interview by the author.

have never seen or have never known what artillery can do. They actually saw [during OIF] how effective artillery was at the company and platoon level and it made believers of them...Our NTCs and CTCs never, ever replicate the effects of artillery.²⁹

Exacerbating these problems are the time required for observer controllers to safe missions, and the time lags between firing a mission and a “fire marker” dropping an artillery simulator at the target location. Maneuver commanders are trained not to expect timely artillery delivered fires during such exercises and the correspondingly low expectations are evident in LTC Leonhard’s “parallel fires” philosophy. Based on these experiences, the prospect of the rapid non-linear operations being planned for Iraq only exacerbated these concerns. These concerns were unjustified: the maneuver and artillery fire support team called for, cleared, and delivered fires in an average time of approximately two minutes.³⁰

The artillery delivered timely fires in support of maneuver units due to close cooperation with them. It was accomplished through well-rehearsed voice clearance of fires drills and calls for fire, and rapid digital fire direction procedures within the artillery battalions. With a grid announced over maneuver command nets, and silence being consent to fire, fire support officers were able to gain clearance from maneuver unit commanders and quickly send their calls over the radio to the firing unit.³¹ The rapidity of fires were absolutely required for Iraqi Freedom’s fluid operations tempo and contributed to the overall forces agility, again because of the effectiveness of the fire support team.

²⁹ LTC Lackey, interview by LTC Pitts.

³⁰ Perkins, interview by the author; Sanderson, telephone interview by the author; Harding, telephone interview by the author.

³¹ Sanderson, telephone interview by the author.

COUNTERFIRE

Counterfire operations during Operation Iraqi Freedom were extremely successful in protecting friendly forces from Iraqi artillery and facilitating their freedom of maneuver. In the 3rd Infantry Division's area of operations alone, they acquired Iraqi artillery fire almost 1,800 times and fired 74 counterfire missions in response. As a result, no American soldiers were lost to enemy artillery fire.³² The importance of effective counterfire was evident at An Nasiriyah where much of the division halted movement and delayed their advance on Baghdad due to Iraqi artillery fire. Movement proceeded only after counterbattery fires silenced the Iraqi guns over the course of a two-hour counterfire fight.³³ Regarding this fight, the brigade commander noted, “The Iraqis had a lot of artillery, he used it extensively, but the combination of Paladin howitzers and the Q36 radar was deadly. If he didn’t move, he was dead. The 1-10 FA fired about 1,000 rounds during the battles around An Nasiriyah. The Iraqis [as a result] very seldom massed fires.”³⁴

Artillerymen also showed tremendous adaptability in dealing with the Iraqi mortars. The Iraqis often delivered mortar fire in urban environments by firing a few rounds and ducking into buildings a few moments after firing. Countering this raised concerns about collateral damage. Fire supporters in the 101st Airborne Division faced with attacks by single mortars found a proper response: “rather than shoot counter-battery with HE, we did it with illum [illumination rounds] to let them know we are tracking

³² CW3 Brian L. Borer and LTC Noel T. Nicolle, “Acquisition!: 3d ID Counterfire in OIF,” *Field Artillery* 8, no. 5 (September–October 2003): 46.

³³ COL Daniel Allyn, Commander of 3rd Brigade, 3rd ID during Operation Iraqi Freedom, interview by Mr. Art Durante of the OIFSG, n.d.

³⁴ Allyn, interview by Mr. Art Durante of the OIFSG.

him...[it was] very effective. The enemy would break contact.”³⁵ These non-lethal counterfire missions restored freedom of maneuver for friendly infantry. The 101st also used the Q36 radars in concert with Army aviation for counterfire effects. The Iraqis would fire mortars from the back of pickup and then immediately displace. According to an artillery battalion commander in the 101st:

Firing [with artillery] at a rapidly displacing target such as a mortar in a pickup truck was ineffective. What did work was having the Kiowa Warriors [scout helicopters] on station and on the brigade fires net and when an acquisition occurred they would fly to the acquisition and take out the target before the vehicle could displace.³⁶

The sole focus of these counterfire missions was the support of friendly maneuver units. Even a small amount of inaccurate artillery or mortar fire was enough to disrupt and delay the movement of friendly forces for significant amounts of time.³⁷ Because of this, counterfire was critical in maintaining the operation’s fast tempo and thus limiting the Iraqi force’s ability to effectively react. Counterfire was another aspect of artillery support in Operation Iraqi Freedom that proved crucial to the success of rapid operations on a non-linear battlefield.

MILITARY OPERATIONS IN URBAN TERRAIN

The artillery continued to provide effective fire support during military operations in urban terrain (MOUT). Artillerymen of the 101st Airborne Division became especially adept at providing timely and accurate fires with limited collateral damage to civilians, their property, and infrastructure such as schools and hospitals in urban areas. At Najaf,

³⁵ LTC Randall Barnes, Commander of 3rd Battalion, 320th Field Artillery, 101st Airborne Division in Operation Iraqi Freedom and others, interview by LTC Pitts of the OIFSG, 24 May 2003.

³⁶ LTC Kevin Batule, Commander of 2nd Battalion, 320th Field Artillery, 101st Airborne Division in Operation Iraqi Freedom, interview by Lieutenant Colonel Pitts of the OIFSG, 23 May 2003.

³⁷ Sanderson, telephone interview by the author

artillery units were very successful employing high explosive (HE) projectiles with variable time (VT) fuzes. The HE/VT combination resulted in airbursts that were devastating against dismounted infantry but had little or no effect on adjacent structures. “In at least one instance, friendly troops were clearing the lower floors of a building when HE/VT swept the roof of enemy soldiers. This was confirmed by the infantrymen who looked out the window to see the dead and wounded foe fall past them.”³⁸



Figure 2-4. 101st Airborne Division (Air Assault) Artillery in Iraq³⁹

The 101st Airborne Division employed their artillery observers in several different ways to ensure responsive fires to maneuver units while at the same time avoiding collateral damage. Due to limited fields of observation in many urban areas, fire support officers assigned several observers to the same target and integrated OH-58 Kiowa Warrior helicopters into their observer plans. This integration provided a redundancy that ensured the availability of observed artillery fires in order to mitigate the risk of collateral damage.

³⁸ COL William L. Greer and others, “101st DivArty: Fighting with Artillery Fires in an Urban Environment,” *Field Artillery* 8, no. 5 (September-October 2003): 17.

³⁹ LTC Henry W. Bennett, Commander 1st Battalion, 320th Field Artillery, 101st Airborne Division during OIF.

The 3rd Infantry Division's experience in MOUT was much the same. In built-up areas such as Baghdad, Iraqi forces would defend road intersections and buildings overlooking those intersections. One armor battalion commander, "realized that just about every road junction and intersection was a likely enemy location, so the artillery fired on these locations before the friendly forces approached them."⁴⁰ Using HE/VT on the rooftops and HE with a point detonating (PD) fuze on the intersections, maneuver commanders would effectively clear the key terrain of enemy forces while on the approach march. As with the 101st Airborne Division's experience, this tactic mitigated collateral damage while maintaining constant pressure on the enemy.

Operations in Iraq's many urban environments were of tremendous concern to commanders prior to the commencement of hostilities. Maneuver commanders were particularly concerned that they would be limited to direct fires and some precision guided aircraft-delivered munitions due to concerns over collateral damage. But given the accuracy and adaptability of the fire support team, artillery fires were delivered with great effect in spite of the unique challenges of urban terrain. Artillerymen remained in continuous support of maneuver operations throughout several operations in a MOUT environment.

CONCLUSION

Field artillery was relevant during Operation Iraqi Freedom because it remained dedicated to supporting friendly maneuver forces throughout the operation. In spite of the rapid tempo of operations in desert, swamp, and urban terrain the artillery remained in

⁴⁰ LTC Jeffrey Sanderson, Commander of 2nd Battalion, 69th Armor, 3rd Infantry Division in Operation Iraqi Freedom, interview by Mr. Art Durante, 13 May 2003.

the fight without pause. Operations during OIF proved that the field artillery has not abandoned its mission of providing close fire support to maneuver commanders and that it is extremely relevant in the current operating environment. Whether delivering artillery fires or synchronizing joint fires in support of maneuver units, the field artillery provided the desired effects at the right place and at the right time during OIF. This ethos of support permeated everything the artillery did. At its essence, this mentality of unwavering support is why the artillery was relevant in OIF and why it must remain at the forefront of artillery doctrine, training, and equipping if the arm is to remain relevant.

CHAPTER 3

FIELD ARTILLERY'S CONTINUED RELEVANCE: LESSONS LEARNED AND REQUIRED CAPABILITIES

INTRODUCTION

While the field artillery was extremely relevant during Operation Iraqi Freedom, it was not without its shortfalls. Equipment and doctrine lessons learned require that the artillery focus upon improving existing capabilities to more effectively provide fire support. Critical issues such as the organization of general support artillery and dud rates unacceptable to maneuver commanders have a direct impact on the artillery's future relevance. If supported commanders refuse to employ an artillery capability then it must be changed or removed altogether from the inventory. The same holds true for systems unable to deliver a needed capability to supported commanders and supporting artillerymen such as artillery firefinder radars. The artillery's shortfalls require critical observation through the lens of fire support as it pertains to faster and more agile operations where every fire mission counts.

GENERAL SUPPORT FIELD ARTILLERY

The Army should re-evaluate its general support artillery force structure in order to remain relevant on future non-linear battlefields where strategic deployability and agility at all echelons is essential. The Army's general support artillery provides fires to division and corps commanders and usually consists of longer-range cannon and rocket systems than the direct support artillery providing fires for maneuver brigades. The bulk of the Army's general support field artillery assets are found within the field artillery brigades organic to the Corps Artillery supporting each Corps. Predominantly MLRS-

based units capable of firing the ATACMS out to 300km, the field artillery brigades provide the corps commander with an all weather fire support asset capable of shaping the commander's deep battlespace in concert with other joint fires assets such as fixed wing fighters and bombers.

The Army last reformed its general support assets in the mid-1970s. The Army's Division Restructuring Program of the time found:

That corps artillery seemed to fight its own battle at times, while division artillery fought its own...corps artillery and division artillery did not seem to coordinate their efforts effectively and acted relatively independent of each other. Both practices dated back to World War II. Corps artillery and division artillery did not seem to coordinate their efforts effectively and acted relatively independent of each other.⁴¹

As a result of the restructuring program, the relationship between the corps and division artilleries was changed from one of independent operations to a more mutually supporting role where:

The corps general support field artillery group [was placed] in a reinforcing role to give the division the first priority in the use of corps artillery and the authority to position corps artillery units where the division felt that they could best contribute to the battle...[also,] the Field Artillery School renamed...the corps artillery group the brigade to bring the name in line with the designation of maneuver units.⁴²

Such a structure served the Army well during Operation Desert Storm where, after the six-month Desert Shield buildup, two Army corps with multiple field artillery brigades in each helped to defeat the Iraqi Army in Kuwait in less than 100 hours about which MG Barry McAffrey, Commander 24th Infantry Division, stated, "Our enormous success was due, in large part, to the artillery."⁴³

⁴¹ Dastrup, *Modernizing the King of Battle: 1971-1991*, 4.

⁴² Dastrup, *Modernizing the King of Battle: 1971-1991*, 6.

⁴³ Dastrup, *Modernizing the King of Battle: 1971-1991*, 61.

While the field artillery brigades made an important contribution to Operation Desert Storm by providing devastating massed fires in support of combined operations, lessons from Operation Iraqi Freedom point to the need for a change in their organization and structure. While the forces in Operation Desert Storm had approximately six months to build combat power prior to conducting offensive operations, the “running start” used in OIF precluded such a buildup and, as a result, limited the employment of general support field artillery assets. According to the V Corps Artillery operations officer:

Base plan called for up to six field artillery brigades and three target acquisition detachments. Because of running start option it was reduced to basically two FA Brigades, one in General support reinforcing and one in reinforcing...at the start of the war both were at a distinct disadvantage. The 214th [field artillery brigade] had one battalion, 2-4 FA, and the 41st [field artillery brigade] had only one battalion, 1-27 FA. Additional battalions did not close until well into the war.⁴⁴

The resultant general support artillery force structure resulted in the 214th Field Artillery Brigade providing fires to V Corps and the 3rd Infantry Division with a single MLRS battalion and the 41st Field Artillery Brigade providing fires to V Corps and the 101st Airborne Division with a single MLRS battalion.

Besides the strategic lift issue, there was an inherent training issue in the field artillery brigades supporting the 3rd Infantry and 101st Airborne Divisions with no prior habitual association save the V Corps “Victory Scrimmage” command post exercise a few weeks prior to commencing offensive operations. Just as OIF’s “running start” precluded a six month strategic buildup like Operation Desert Shield, so too did it preclude a great deal of training between supported and supporting forces without a

⁴⁴ LTC Robert Cheatham, G-3 of V Corps Artillery interview by LTC Pitts, U.S. Army Operation Iraqi Freedom Study Group (OIFSG), 7 May 2003.

habitual relationship. The 41st field artillery brigade commander remarked on supporting the 101st Airborne Division prior to commencing offensive operations:

The TTPs (Tactics Techniques and Procedures) on how they bring the fire plan together are a little different. On the general support side of the house with what we have worked through previously with the 11th Aviation, we have a robust C4ISR capability embedded with the 11th Aviation. We have all worked underneath V Corps. The 101st is a FORSCOM unit, so although they have that robust C4ISR capability also, it is different priorities...but we have rehearsed with them in "Victory Scrimmage".⁴⁵

As a result of the OIF force packaging, division commanders were receiving supporting fires from one artillery battalion through a field artillery brigade headquarters with little previous training or integration into that division's operations.

While the field artillery brigades did provide timely and accurate fires in support of the corps commander as well as the division commanders, it was in spite of their organization. At the completion of combat operations LTG William Wallace, the V Corps Commander remarked upon the general support artillery force structure, "I think, perhaps, we've got too much artillery in the force structure, if the Air Force is going to be as available as it proved to be in this campaign. I'm not suggesting we do away with all the field artillery brigades, but I am suggesting that the brigades could be a little smaller."⁴⁶ In a subsequent interview he remarked, "The whole war was fought with two reinforcing [general support] field artillery battalions, not brigades. Had two brigade headquarters but each had only one battalion. Suggests to me there is too much reinforcing artillery in the Army."⁴⁷ Just as the Army changed the general support

⁴⁵ COL Charles Otterstedt, Commander of 41st Field Artillery Brigade, V Corps Artillery, interview by COL MacLean, V Corps Command Historian, 14 March 2003.

⁴⁶ LTG William Wallace, Commander V Corps, interview by COL MacLean, V Corps Command Historian, 15 April 2003.

⁴⁷ LTG William Wallace, Commander V Corps, interview by LTC Kirkman of the OIFSG, 14 May 2003.

artillery force structure in the 1970s to provide the divisions with a more dedicated general support capability, the Army should carry this change a step further by providing the divisions with a more robust general support capability and eliminating many of the field artillery brigade headquarters at corps level in the process.

The Army should only retain one field artillery brigade per corps. This one field artillery brigade will provide the corps commander with long-range, primarily ATACMS, fires with which to shape the corps battlespace and as a complement to other joint fires. The brigade would be general support to the corps and may require only one or two battalions depending upon the mission. The Army's ten divisions would receive an additional general support artillery battalion organic to their organization. For the heavy divisions this would be a HIMARS battalion in addition to its general support MLRS battalion. For the light divisions, this additional general support artillery would be a HIMARS battalion in lieu of its 155mm M198 battery. Such a structure would provide heavy and light division commanders with additional organic firepower that is deployable via C-130 and which, with the fielding of GMLRS (60Km range), will obviate the need for significant ATACMS support from corps. Additionally, the HIMARS battalion as an organic unit will allow the division commander to conduct short notice combat operations with general support artillery that is fully integrated into the division's training plan and communications architecture. Such a force structure would provide the corps and division commanders with a rapidly deployable organic fires capability and reduces the need for significant amounts of general support field artillery brigades and their corresponding headquarters in the Army's force structure.

DUD RATE

The dud rate associated with Improved Conventional Munitions (ICM) limited their use during OIF. This should be reduced for all cannon and rocket systems. The submunitions were first employed by the US during the Vietnam War. They are designed to produce anti-personnel effects and the dual-purpose variants found in rockets and heavier caliber (155 mm) cannon projectiles penetrate armor as well.⁴⁸ Government testing and operational use since their inception point to dud rates in excess of 10% for artillery delivered ICM currently in the U.S. inventory. A volley of 12 multiple launch rocket system rockets alone would result in 1,236 unexploded bomblets, out of 7,728 total, spread out over an area of 120,000 to 240,000 square meters.⁴⁹ This would present a significant danger to military personnel as well as civilians and possibly hinder operations.

Twenty-two soldiers were killed and fifty-eight wounded by unexploded submunitions after the first Gulf War.⁵⁰ The danger posed to military personnel and civilians prompted several Congressional inquiries and a January 2001 memo from Secretary of Defense William Cohen setting less than 1% as the dud rate goal for all DOD cluster munitions in development. None of the artillery-delivered bomblets employed during OIF achieved this threshold.

⁴⁸ U.S. Army, Field Manual (FM) 3-09.60 (Draft), *Tactics, Techniques, and Procedures (TTP) for Multiple Launch Rocket System (MLRS) Operations* (Washington, DC: Department of the Army, September 2002), 1-13.

⁴⁹ Human Rights Watch, *A Global Overview of Explosive Submunitions* (Washington DC: Human Rights Watch, May 2002): 1.

⁵⁰ Paul Wiseman, "Ground Forces Won't Use Improved Cluster Bombs Until At Least 2005," *USA Today*, 11 December 2003, A7.

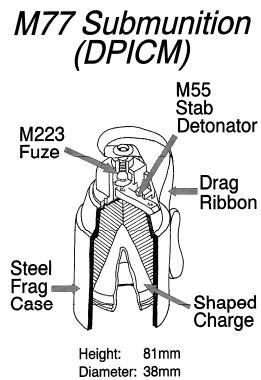


Figure 3-1. MLRS Delivered ICM Submunition⁵¹

During Operation Iraqi Freedom, the 101st Airborne and 3rd Infantry Divisions fired the vast majority of their missions using high explosive cannon munitions rather than dud producing ICM. The 3rd Infantry Division's Assistant Division Commander remarked, "In hindsight, the division carried too much dual purpose improved conventional munitions (DPICM) and not enough high explosive (HE) field artillery ammunition because the actual use of HE was much greater than the planning factors predicted."⁵² All three direct support artillery battalions in the 101st Airborne Division went to war with little or no ICM, opting instead for high explosive (HE) munitions. As one artillery battalion commander commented, "the dud rate of the DPICM, is something that needs attention I believe, and we have to understand what is happening with dud producing munitions, particularly when a light infantry force is going to come in behind."⁵³ This was in spite of the significant ICM included in their unit basic load but left-behind in Kuwait. The mechanized 3rd Infantry Division had an even greater percentage of ICM in its unit basic load, but maneuver brigade and task force commanders as well as their

⁵¹ U.S. Army, Field Manual (FM) 3-09.60 (Draft), *Tactics, Techniques, and Procedures (TTP) for Multiple Launch Rocket System (MLRS) Operations*, 1-7.

⁵² BG Louis Weber, Assistant Division Commander (Support) 3rd Infantry Division in Operation Iraqi Freedom, interview by Mr. Fontenot of the OIFSG, 24 September 2003.

⁵³ Bennett, interview by LTC Pitts; Barnes, interview by LTC Pitts; LTC Batule, interview by LTC Pitts.

supporting artillery commanders were unanimous in their concern for the effect of duds on their forces and the Iraqi civilians.⁵⁴ As a result, the predominant munition fired was HE in spite of it being only one-sixth of their basic load.

HE fires were extremely effective against both dismounts and armored vehicles. ICM was fired by the 3rd Infantry Division only due to, “a resupply problem [with HE] at the end [of combat operations] and [we] had no option but to fire DPICM” according to the Division Artillery Commander.⁵⁵ The ICM missions also had tremendous killing power against dismounted enemy and armored vehicles. However, HE remained the munition of choice throughout the conflict with ICM fired as a last resort after careful targeting to avoid built-up areas during Phase IV operations. In spite of these deliberate preventative measures, Iraqi civilians were killed and wounded by artillery-delivered submunitions with forty civilians reportedly killed in the town of Hillah alone.⁵⁶

In order to mitigate the risk of dud submunitions while still achieving ICM’s destructive effects, the field artillery should ensure that future ICM munitions achieve a dud rate of less than 1%. The next generation of ICM munitions currently in development includes the guided MLRS (GMLRS) rocket that carries 404 ICM submunitions, vice 644 submunitions in the standard M26 rocket, to ranges beyond 60 kilometers. The unclassified GMLRS operational requirements document of 18 April

⁵⁴ Allyn, interview by the author; Perkins, interview by the author; Marcone, telephone interview by the author; Sanderson, telephone interview by the author; Harding, telephone interview by the author; Bennett, interview by LTC Pitts.

⁵⁵ COL Thomas Torrance, Commander of 3rd Infantry Division Artillery in Operation Iraqi Freedom, interview by Lieutenant Colonel Pitts of the OIFSG, 11 May 2003.

⁵⁶ Paul Wiseman, “Cluster Bombs Kill in Iraq, Even After Shooting Ends,” *USA Today*, 11 December 2003, A1.

2001 establishes a threshold hazardous dud rate of less than 1% and an objective of 0%.⁵⁷

Based upon developmental testing ending in December 2002, the GMLRS achieved an average dud rate of 3.9%, an improvement over the current MLRS ICM dud rate of approximately 16% but still not meeting the requirement.⁵⁸ The Army should ensure that GMLRS meets the less than 1% requirement prior to full rate production if the munition is to be relevant in future operations.

Additionally, the Army is developing a GMLRS variant with an HE warhead called GMLRS Unitary. Based upon current procurement estimates, the Army will purchase almost three times as many ICM rockets as HE rockets by fiscal year 2018.⁵⁹ Keeping in mind the effectiveness and predominant use of HE munitions in Operation Iraqi Freedom, the Army should reassess the quantities and perhaps produce a higher ratio of GMLRS Unitary to GMLRS rockets to better support future operations.

The dud rate issue with ICM and its corresponding role on the future battlefield are extremely important because they relate directly to relevance. Artillery unit basic loads, and the inventories that support them, are built around ICM. This is especially true for the rocket and 155 millimeter cannon forces. Originally developed for use against Warsaw Pact armored formations on the plains of Europe during the Cold War, the current ICM design's time is long past. Iraqi Freedom only highlighted the Army's need for killing munitions without duds.

⁵⁷ Department of the Army, *Unclassified Operational Requirements Document for MLRS ACAT II and III Systems Prepared for Milestone III Decisions* (Washington, DC: Department of the Army, 18 April 2001), 18.

⁵⁸ U.S. Army Test and Evaluation Command (USATEC), *Unclassified System Evaluation Report for the GMLRS* (Alexandria, VA: USATEC, March 2003).

⁵⁹ Product Manager-Guided MLRS (GMLRS), *(Draft) Modified Integrated Program Summary (MIPS) for GMLRS with Unitary Warhead (GMLRS Unitary) Milestone B Decision Review* (Redstone Arsenal, AL: PM-GMLRS, 2 March 2003).

COUNTERFIRE RADAR

While counterfire operations were successful against Iraqi artillery, the AN/TPQ37 (50 Km planning range) and AN/TPQ36 (25 Km planning range) firefinder radars used to detect enemy artillery experienced serious problems in the areas of reliability and positioning. Across both the 101st Airborne and 3rd Infantry Division Artilleries (2 x Q37 and 3 x Q36 radars each), the firefinder radars had significant maintenance issues. The 3rd Infantry Division Artillery Commander, commenting on his counterfire radars remarked, “Our firefinder radars had significant maintenance issues. When they are working they are the greatest. [We] had one Q-37 down almost 14 days. [We] had a Q36 down for the entire 21 days.”⁶⁰ The 101st Airborne Division fared little better, with Q36 radars across the division artillery down intermittently throughout the operation.⁶¹

This lack of reliability had serious consequences for the positioning of these already scarce assets. As Q36 and Q37 radars in support of main effort units went down intermittently, artillery commanders with the supporting effort maneuver forces were forced to re-position their radars. The radars were often re-positioned over long distances given the non-linear nature of operations in order to support the main effort. All this re-positioning took place while both the main and supporting efforts were pressing the fight forward and often in contact.

As a result, radar coverage was sometimes lacking at critical junctures in the fight. Within the 3rd Infantry Division’s area of operations, the 3rd Battalion, 69th Armor’s seizure of a bridge across the Euphrates was an essential task for the V Corps

⁶⁰ Torrance, interview by LTC Pitts.

⁶¹ Barnes, interview by LTC Pitts; Batule, interview by LTC Pitts.

Commander. This bridge crossing, at Objective Peach, was just one such critical time when counterfire coverage was lacking. The battalion commander noted that as they began the operation, “the Q36 was broken and we thought we had Q37 coverage but we didn’t.”⁶² The battalion’s Alpha Company received significant incoming artillery fire, from an Iraqi 152 millimeter battalion, on the nearside of the bridgehead. While sustaining no casualties, the enemy artillery did delay the company’s operations. Fortunately, the majority of Iraqi artillery fire fell into the Euphrates without adjustment and the battalion was able to seize the bridge.⁶³

At Objective Peach, and throughout OIF, the Iraqi artillery while superior in tube-strength and range capability was largely ineffective. The Iraqis relied heavily on pre-planned targets and were usually unable to adjust these fires after losing most of their observers to direct fire engagements.⁶⁴ In the case of Objective Peach, if the Iraqis had massed their fires more accurately on the bridgehead the problems with radar availability and positioning would have negatively impacted the V Corps’ scheme of maneuver and cost the lives of many more Americans.

The field artillery must provide continuous counterfire coverage to supported commanders in future operations. This capability is especially vital to operations such as OIF where mass was sacrificed for speed and agility. Against an enemy well-trained in and well-equipped for artillery operations, successful counterfire operations will be essential to maintaining this operational tempo and agility. To accomplish this, the Army must develop new firefinder radar systems that, at a minimum, are more reliable than the

⁶² LTC Earnest Marcone, Commander of 3rd Battalion, 69th Armor of the 3rd Infantry Division in Operation Iraqi Freedom, interview by LTC Manning of the OIFSG, 15 May 2003.

⁶³ Marcone, telephone interview by the author.

⁶⁴ Marcone, telephone interview by the author.

current Q36 and Q37 radars, more deployable, and able to support maneuver units in high tempo operations. The Q37, in particular, “lacks sufficient range, accuracy, mobility, survivability, sustainability, and deployability by one C-130, to provide required operational support for current and future forces.”⁶⁵ As the Army procures increasing numbers of precision munitions such as GMLRS and the GPS-guided Excalibur 155mm projectile, sensor coverage of the battlefield becomes even more critical to provide accurate and timely targeting information with mobile sensors to support high-tempo non-linear operations. The Q47 radar currently under development will be accurate to within 50 meters of actual target location at ranges beyond 100 Km and capable of rapid transport by two CH-47 medium lift helicopter sorties, but it will not be fielded until 2008 at the earliest.⁶⁶ In the interim, the Army should consider providing each division artillery with additional Q36 and Q37 radars for a redundancy that ensures maneuver units do not lack counterfire coverage and retain their freedom of maneuver.

The Army should also consider equipping its conventional forces with Lightweight Counter-Mortar Radar (LCMR) currently under development for the U.S. Special Operation’s Command (USSOCOM) whose primary purpose is:

To detect, locate, and report hostile locations of enemy mortar, artillery, or other indirect fire assets...[and] because SOF operations are conducted forward of conventional units [in a non-linear battlespace], ARSOF require an omni-directional detection capability...the LCMR provides mortar and artillery fire detection capability out to 5,000 meters.....potential threat forces and capabilities range from sophisticated, regular military forces and highly trained

⁶⁵ Department of the Army, *Unclassified Operational Requirements Document for Phoenix Battlefield Sensor System (AN/TPQ-47)* (Washington, DC: Department of the Army, 27 October 2003), 10.

⁶⁶ Department of the Army, *Unclassified Operational Requirements Document for Phoenix Battlefield Sensor System (AN/TPQ-47)*, 12.

terrorist/paramilitary elements to relatively untrained and ill-equipped insurgency forces⁶⁷

Such a purpose statement, written prior to 9/11, applies to conventional forces engaged in the Global War on Terror as much as it does for special operating forces (SOF). This man-portable system, capable of being “jumped” via parachute by two soldiers, would provide an extremely mobile and omni-directional sensor capability and provide complementary counterfire coverage to maneuver units. Scouts, or other forward reconnaissance units could employ such a lightweight sensor forward of the main body so that maneuver elements are always covered by a counterfire umbrella regardless of the maintenance status or positioning of the firefinder radars.

OIF highlighted the need for sensors that are reliable and can maintain operational tempo with maneuver units. This is particular true with regards to counterfire coverage, the lack of which can deny friendly forces freedom of maneuver and limit their mobility in a non-linear environment. As the Army moves to a greater reliance on precision munitions with a commensurate reduction in tube-strength, particularly in the area of general support field artillery, sensors will become as important if not more so than the delivery systems themselves. Relying on one Q36 radar per maneuver brigade and two Q37 radars per division is simply not enough to retain consistent counterfire coverage in a fast-paced non-linear environment. Additional sensors are needed that ensure redundant coverage as well as mobility on the battlefield.

⁶⁷ Department of the Army, *Unclassified Operational Requirements Document for Lightweight Counter-Mortar Radar (LCMR)* (Washington, DC: Department of the Army, 28 February 2001, 1-2).

SUPPORT TO SPECIAL OPERATIONS FORCES

A watershed event for the field artillery during OIF was the placement of a field artillery unit in direct support of special operations forces (SOF). A platoon of three High Mobility Artillery Rocket System (HIMARS) supported SOF operations throughout. The launchers fired a total of forty Army Tactical Missile System (ATACMS) missiles against artillery, air defense, surface-to-surface missile, and infantry target sets.⁶⁸ Special forces soldiers worked closely with the launchers, forming a 24/7 all-weather capable sensor to shooter link that successfully struck all forty targets.⁶⁹

The HIMARS mission in Iraq was extremely significant as it demonstrated that the field artillery is no longer tied to its historical role of supporting conventional ground maneuver forces. The artillery has historically been incompatible with the small-scale and often covert operations of SOF due to deployability issues and its inherently large firing signature. The HIMARS, however, provides a long-range precision capability that is C-130 transportable and ready for operations within a few minutes of landing. As SOF continue to take a leading role in the Global War on Terror, the field artillery now has a system to provide them with responsive and accurate all-weather fires.

In spite of the HIMARS success in support of SOF during OIF, there is a dearth of field artillery involvement with the SOF community as a whole and specifically with the Army Special Forces. At the 2003 Senior Fire Support Conference at Fort Sill the commander of the U.S. Army John F. Kennedy Special Warfare Center and School (USJFKSWCS) stated that:

⁶⁸ Product Manager-High Mobility Artillery Rocket System (PM-HIMARS), *HIMARS: Operation Iraqi Freedom* (Redstone Arsenal, AL: PM-HIMARS).

⁶⁹ Neil Baumgardner, “Special Forces Used HIMARS During Operation Iraqi Freedom,” Defense Daily 218, no. 41 (28 May 2003): 1.

Special Forces will continue to conduct Unconventional Warfare with indigenous resistance forces, as well as unilateral or combined Strategic Reconnaissance and Direct Action in the entirety of Battlespace in support of the strategic main effort and/or Conventional Forces, necessitating responsive Precision Joint Fires (both lethal and non-lethal) with virtually unconstrained reach...[Special Forces need] joint fires expertise at all critical junctures (coordination and operational)...[But there exists] no standing joint fires element within the SF Groups...[and] Joint Fires Elements (JFE) must be established and trained for each Special Forces based JSOTF.⁷⁰

MG Lambert's words point to a vacuum in the area of fire support to Army Special Forces. The field artillery should move quickly to fill this void with the dedicated fire support expertise it has long provided to conventional forces.



Figure 3-2. HIMARS Firing in Support of SOF Operations in Western Iraq.⁷¹

Field artillerymen have historically taken the lead in planning, coordinating, and executing the duties and responsibilities of fire support elements and fires and effects coordination cells (FECC) in support of conventional echelons from platoon to echelons above corps. The field artillery should extend its fire support expertise to the realm of Special Forces by establishing a fire support element, led by an artilleryman, in each Special Forces Group. Such an arrangement would provide the Special Forces units with

⁷⁰ MG Lambert, Commander U.S. Army John F. Kennedy Special Warfare Center and School (USJFKSWCS), *Joint Precision Fires in Support of Special Operations Forces* (Fort Sill, OK: Senior Fire Support Conference, November 2003).

⁷¹ Product Manager-High Mobility Artillery Rocket System (PM-HIMARS), *HIMARS: Operation Iraqi Freedom* (Redstone Arsenal, AL: PM-HIMARS).

expertise in joint fires integration and also enhance the field artillery's relevance in the Global War on Terror through its support to the war's lead combatant command, USSOCOM. Such an arrangement would cause:

The Field Artillery to think beyond imbedded constructs of support to Army Corps, Divisions, Brigades, Units of Employment, and Units of Action...[The] FA should be the lead intellectual impetus to place fires wherever, and whenever they are needed in battlespace. Both lethal and non-lethal...to enable the joint force to fight more effectively in the information age environment.⁷²

DIGITAL FIRE SUPPORT

Artillery and maneuver commanders were pleased with the performance of digital communications systems such as the Advanced Field Artillery Data System (AFATDS) during Operation Iraqi Freedom. This was particularly true in its fire direction role from battalion and battery/platoon fire direction centers where the computers provided accurate and timely technical and tactical digital fire direction directly to the firing platforms.⁷³ The one AFATDS complaint common amongst artillery commanders was the software complexity at the battery and below. Rather than a "one size fits all" software package for fire support elements (FSEs) and FDCs from the corps down to a platoon, commanders need a much simpler fire direction system at the battalion level and below.⁷⁴

Unlike the AFATDS, the digital forward entry devices (FEDs) used by observers to initiate fire missions at the tactical level were not effective during OIF. While the fire support teams (FISTs) and combat observation laser teams (COLTs) from the 101st Airborne and 3rd Infantry Divisions are all equipped with the FED, they did not use the

⁷² MG Lambert, *Joint Precision Fires in Support of Special Operations Forces*.

⁷³ Harding, telephone interview by the author.

⁷⁴ LTC Lackey, interview by LTC Pitts.

device to initiate fire missions.⁷⁵ This was partially due to its range limitations, but many commanders insisted on voice communications between the observer in contact and the fire direction center providing the fires. Their insistence was not due to a fear or ignorance of digital communications, but an acknowledgement of the human dimension's importance at the tactical level.

While modern cannon and rocket systems are more accurate than ever before, “fires are slower, impersonal and sequestered in a fire support stovepipe isolated from maneuver” when initiated by observers with digital devices.⁷⁶ A digital email message cannot express the urgency of the soldier in contact. Currently, the Field Artillery School is “aggressively pursuing” the development of the Palm Forward Entry Device (PFED) and lightweight FED (LFED) as replacements for the FED.⁷⁷ The Army should stop both programs and divert its resources to others that will enhance the warfighter’s needs. Based upon Iraqi Freedom, and the overdue acknowledgement of the human nature of men in contact, digital entry devices are not relevant to providing fires to maneuver and the Army should spend its scarce resources on procuring other more worthwhile systems.

FORCE PROTECTION

The field artillery should enhance its tactical force protection capabilities in order to provide sustained supporting fires in future operations. Specifically, more crew-served weapons and better protection for key leaders are needed to increase survivability. Operation Iraqi Freedom’s non-linear battlefield meant that all units within the

⁷⁵ Bennett, interview by LTC Pitts; Batule, interview by LTC Pitts; Harding, telephone interview by the author.

⁷⁶ COL Gary H. Cheek, “Why can’t Joe get the lead out?,” *Field Artillery* (January-February 2003): 34.

⁷⁷ MG Michael D. Maples, “2002 State of the Field Artillery,” *Field Artillery* (November-December 2002): 4.

battlespace were frequently in contact with Iraqi forces and not just the forward maneuver units. Within such a fluid battlespace, equipping and training the total force for close combat becomes more crucial than ever before.⁷⁸

MLRS batteries are a prime example of units in great need of such training and equipping. Doctrinally, MLRS units:

Are positioned and fight well forward and use their "shoot-and-scoot" capability to improve survivability. Forward positioning is critical to accomplishing unit missions. When providing close support in the offense, MLRS units move with the maneuver forces they support, stop to fire as required, and then move rapidly to rejoin the formation.⁷⁹

MLRS launchers do not have any crew-served weapons capability and instead rely upon the above-mentioned "shoot-and-scoot" tactic. While an effective tactic against enemy counterfire, "shoot-and-scoot" provides little or no protection from a lightly motorized infantry force or even lightly armed insurgents that could easily pursue and destroy such a high value asset. Likewise, the prototype HIMARS rocket launchers that debuted in Operation Iraqi Freedom in support of SOF have no crew-served weapon. This is an even greater vulnerability compared to the tracked MLRS because the HIMARS platform is built from an unarmored truck chassis.

Weapon platforms are not the only items requiring additional force protection measures. Commanders led their units from the front during OIF, constantly pushing forward of the main body to coordinate with adjacent units and reconnoiter potential firing positions. While absolutely necessary for mission accomplishment, leaders conducted these forward reconnaissance missions in soft-skinned high mobility multi-purpose wheeled vehicles (HMMWVs) were extremely vulnerable to even the smallest

⁷⁸ Williamson Murray and Robert H. Scales, Jr., *The Iraq War: A Military History* (Cambridge, MA: The Belknap Press of Harvard University Press, 2003), 246.

⁷⁹ FM 3-09.60, *MLRS TTP*, 1-1.

caliber weapons. The 3rd Infantry Division Artillery Commander emphasized this issue when he stated, “In our firing batteries we put steel around our weapons but none around our leaders including platoon leaders, platoon sergeants, first sergeants, [and] battery commanders [who] were all out there in soft skin vehicles.”⁸⁰ During a reconnaissance of his unit’s follow-on positions, a battery commander from the 3rd Infantry Division was killed when his soft-skinned HMMWV was ambushed with small-arms fire and rocket propelled grenades. Although nothing will ever completely mitigate the risk of leadership from the front, providing key leaders with armored HMMWVs equipped with a crew-served weapon is an absolutely essential first step in improving leader survivability.

Improving the survivability of artillery weapons platforms and vehicles for key leaders, is an investment in sustained fire support for future operations. With OIF as an example, future conflicts promise to be even more fast-paced and decentralized in order to create an operational tempo to which the enemy cannot react in time. As a result, the Army will continue to trade mass for faster deployability and employability as it restructures the force. In such a lean and agile force, every weapon system counts. This is especially true for the artillery systems that provide a commander with his most significant all-weather, twenty-four hour fire support capability. Given this additional importance as well the expectation of even more non-linear battlefields, increased force protection capabilities for the artillery are absolutely essential.

⁸⁰ Torrance, interview by LTC Pitts.

SENSE AND DESTROY ARMOR MUNITION

On 21 March 2003, artillery units fired the Sense and Destroy Armor (SADARM) munition for the first time in combat at the battle for Tallil air base.

SADARM is a “smart” artillery submunition designed for precision engagement of self-propelled howitzers as well as other lightly armored vehicles...Each 155mm howitzer round delivers two submunitions. Once dispensed, the submunition deploys a parachute-like deceleration device. At a pre-determined distance from the ground, the submunition ejects the deceleration device and deploys another device to stabilize and rotate the submunition. As the submunition falls and rotates, it searches the ground with a millimeter wave sensor (both active and passive) and an infrared sensor array...If the sensors detect a target, the submunition fires an explosively formed penetrator at the target. If no target is detected, the submunition is designed to self-destruct.⁸¹

With no special targeting procedures besides a minimum safe distance from friendly troops of two kilometers, units fired the rounds successfully at Iraqi tank formations. The 1st Battalion, 10th Field Artillery reported killing one T-62 tank with only two SADARM rounds, and the 1st Battalion, 41st Field Artillery reported similar results against the more modern and better protected T-72 tank.⁸² In spite of these successful missions, SADARM is only available in limited quantities from the program’s low rate initial production.

The Army decided in 1999 not to proceed into full rate production based, in part, on a submunition reliability of 44% which fell far short of the 80% requirement during its initial operational test⁸³ However, the Army used flawed targeting and fire direction procedures in developmental and operational testing when compared with its employment

⁸¹ Director, Operational Test and Evaluation (DOT&E) *DOT&E Annual Report to Congress* (Washington, DC: Department of Defense, 1998), IV-1.

⁸² Harding, telephone interview by the author; Lackey, interview by LTC Pitts.

⁸³ Department of Defense, Defense Operational Test and Evaluation (DOT&E) *DOT&E Annual Report to Congress*, IV-3.

in OIF. According to the Department of Defense's Director, Operational Test & Evaluation (DOT&E):

It appears that the Army's doctrine of firing 24 rounds at each target is inefficient. With one exception, the targets that were killed during the LUT [limited user test] were hit in the first 12 rounds...As was observed during firings in prior technical testing and IOT [initial operational test], targets that are hit are generally killed. In addition, 60 percent (114/190) of the submunitions had no targets in their footprint. This may be improved by leveraging Firefinder's increased accuracy in locating individual guns (as opposed to the entire threat battery). A doctrine that targets individual guns, rather than the whole battery, may provide a more efficient use of SADARM rounds.⁸⁴

Results from OIF where only two, versus twenty-four, rounds were fired at each individual tank seem to lend credence to DOT&E's hypothesis.

Based on SADARM's successful employment during OIF, the Army should consider additional developmental and operational testing using fire direction and targeting procedures more in line with those used during OIF. In the words of the 3rd Infantry Division Artillery Commander, "SADARM was the big winner [during OIF]. We had a 50% kill rate using SADARM."⁸⁵ The bottom line is that units in contact need the lethal precision that SADARM provided against armored targets during Operation Iraqi Freedom. Such a capability is especially vital as the Army continues to trade mass for agility and deploys its Stryker Brigade Combat Teams. These Stryker Brigades consist of light armored vehicles that, while more strategically deployable than the M2 Bradley fighting vehicle or M1A1 tank, are not nearly as survivable. These units, in particular, will need an effective standoff capability against an enemy's armored vehicles. Besides the potential for precision strike and reduced munitions consumption, an

⁸⁴ Department of Defense, Defense Operational Test and Evaluation (DOT&E) *DOT&E Annual Report to Congress*, IV-4.

⁸⁵ Torrance, interview by LTC Pitts.

effective SADARM munition would mitigate the need for the high number of ICM munitions in unit basic loads tailored for targeting large armored formations. Whether or not the SADARM munition itself survives these further reviews is unimportant. What should be done is to leverage the lessons learned from Iraqi Freedom with the baseline SADARM technology in order to provide maneuver commanders a precise and lethal fire support capability.

LONG RANGE ADVANCED SCOUT SURVEILLANCE SYSTEM

Even though COLTs organic to direct support artillery battalions often provided supported commanders with their most forward-deployed fire support sensors during Operation Iraqi Freedom, they were not equipped with effective observation devices to initiate fire missions. The COLTs are equipped with the ground vehicular laser locator designator that is unable to laze on the move and relies on a thermal sight with very limited range for night operations. COLTs in the 3rd Infantry Division relied upon the brigade reconnaissance troop's Long Range Advanced Scout Surveillance System (LRAS3) to initiate their calls for fire.

The LRAS3 provided an all-weather target acquisition capability due to its forward-looking infrared radar (FLIR) and extremely accurate target location beyond ten kilometers day or night.⁸⁶ Brigade commanders formed the COLTs and brigade reconnaissance troop (BRT) into detachments able to screen forward or to the flanks of the brigade formation. The detachments were also used to great effect in overwatch of target areas of interest providing first round fire for effect accuracy. However, the

⁸⁶ Defense Daily, "Long Range Advanced Scout Surveillance System (LRAS3)," *DefenseDaily.Com*, URL: <www.defensedaily.com/progprof/army/lras3.pdf> January 2004.

COLTS had to relay the calls for fire from the BRT to the artillery battalion because they lacked the LRAS3.⁸⁷

Equipping the COLTs with the LRAS3 would make them more relevant as fire support sensors and provide the supported commander with greater flexibility in their employment. Doctrinally, the COLTs provide the supported commander with “independent observers to weight key or vulnerable areas.”⁸⁸ Due to their reliance on the LRAS3, the COLTs were unable to conduct these independent missions. While the marriage of BRT and COLTs was a successful ad hoc technique to provide the supported brigade commanders with eyes forward for intelligence as well as targeting, there is currently a mismatch between capabilities and equipment. Equipping the COLTs with the LRAS3 will allow them even greater employment flexibility and correspondingly improve their ability to provide commanders with fire support.

CONCLUSION

The field artillery was relevant during Operation Iraqi Freedom because it provided timely, accurate, and agile support to maneuver forces on a rapidly changing non-linear battlefield. Likewise, the artillery must take a hard look at its shortcomings by focusing on how they affected artillery delivered fire support and rapidly make the appropriate changes. The Army must shape its force structure, acquisition of improved field artillery materiel, and doctrine development based upon the lessons learned from Operation Iraqi Freedom. Improvement in these three areas alone will move the artillery from a linear battlefield focus reminiscent of the Cold War and into a more agile force

⁸⁷ Allyn, interview by the author..

⁸⁸ U.S. Army, Field Manual (FM) 3-09.4 (Draft), *Tactics, Techniques, and Procedures (TTP) for Fire Support for Brigade Operations* (Washington, DC: Department of the Army, October 2003), F-1.

able to support maneuver commanders on the non-linear battlefields across the full spectrum of conflict, high intensity to support and stability operations, seen thus far in the Global War on Terror.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Contrary to many indicators at the commencement of the Global War on Terror, the field artillery has been extremely relevant in the war's opening phases but it is too early to ascertain the artillery's relevance in the broader context of the Global War on Terror. This is because the fight against terror promises to be a very long one, and the operations in Afghanistan and Iraq only its opening shots. Additionally, the unique characteristics of the different tactical environments in Iraq and Afghanistan point to an ever-increasing requirement for tactical agility and flexibility on the part of U.S. forces. The artillery must be flexible in rapidly identifying and adapting its force based to face future challenges in the broader campaign against terror.

The field artillery that entered the Global War on Terror on 9/11 must change if it is to be relevant in winning the war. The pre-9/11 field artillery emphasized the first half of its mission, **“To destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fire and to help integrate all fire support assets into combined arms operations.”**⁸⁹ with a focus on big weapon systems such as the Crusader and massed field artillery brigades supporting divisions in contact. Operations in Afghanistan and Iraq; however, point towards a focus upon the latter half of the mission and the integration of all fires, lethal and non-lethal as well as joint, into combined arms operations. Field artillerymen in Afghanistan are manning howitzers and mortars in support of maneuver units. They are further coordinating the execution of close air support and information operations. In

⁸⁹ U.S. Army Field Artillery School, “Field Artillery Mission.”

Iraq the U.S. Army fought an economy of force mission, with regards to artillery tube strength. In spite of this, commanders adjusted their support relationships to weight the main effort and ensured that the guns were pushed forward with lead maneuver companies. Additionally, the number and availability of counterfire radars and other sensors to accurately detect targets proved more vital to operations than sheer numbers of tubes.

While ultimately successful, the artillery's support of maneuver operations did fall short in some key areas such as counterfire and munition dud rates. Critical force protection and observation capabilities also limited artillery delivered fire support. The commensurate adjustments to these shortcomings must come quickly and must ultimately support the fire support needs of maneuver commanders. Just as the operational force must become more agile in its operations, it must also become more agile in its ability to change. Gone is the forty-year Cold War against a symmetric foe, and here to stay are operations against foes as different as the Taliban in Afghanistan and Saddam Hussein's regime in Iraq with less than eighteen months separating the start of both operations.

Finally, the fire support aspect of artillery operations must guide these necessary changes. "Fire support is too important to be left to field artillerymen alone."⁹⁰ The field artillery is a vital component of and integrator of lethal and non-lethal fires as part of a broader fire support team and not as a stand-alone arm. Operations in Afghanistan and Iraq have proven time-and-time again that the key to success is not just artillery support, close air support, or mortar support. Instead, it is the complementary effects from these and other lethal and non-lethal fire support systems that effectively support combined

⁹⁰ Sanderson, telephone interview by the author.

arms operations. While the future course of the Global War on Terror remains to be seen, the U.S. Army Field Artillery can best posture itself for relevance by consistently improving its contribution to the fire support team and combined arms operations.

ACRONYMS

AFATDS	Advanced Field Artillery Data System
ATACMS	Army Tactical Missile System
BCT	Brigade Combat Team
BG	Brigadier General
BFIST	Bradley Fire Support Team (vehicle)
BRT	Brigade Reconnaissance Troop
CAS	Close Air Support
COL	Colonel
COLT	Combat Observation Laser Team
CPT	Captain
CTC	Combat Training Center
C4ISR	Command Control Communications Computers Intelligence Surveillance Reconnaissance
DOT&E	Director, Operational Test & Evaluation
DPICM	Dual Purpose Improved Conventional Munition
EFST	Essential Fire Support Task
FDC	Fire Direction Center
FECC	Fires Effects Coordination Center
FED	Forward Entry Device
FIST	Fire Support Team
FIST-V	Fire Support Team Vehicle
FSCOORD	Fire Support Coordinator
FSE	Fire Support Element
GMLRS	Guided Multiple Launch Rocket System
HE	High Explosive
HIMARS	High Mobility Artillery Rocket System
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HPTL	High Payoff Target List
ICM	Improved Conventional Munition
JFE	Joint Fires Element
JROC	Joint Requirements Oversight Council
Km	Kilometer
LCMR	Lightweight Counter-Mortar Radar
LFED	Lightweight Forward Entry Device
LRAS3	Long Range Advanced Scout Sensor System
LT	Lieutenant
LTC	Lieutenant Colonel
LTG	Lieutenant General
MAJ	Major
MG	Major General
MLRS	Multiple Launch Rocket System
MOUT	Military Operations in Urban Terrain

NTC	National Training Center
OIF	Operation Iraqi Freedom
OPTEMPO	Operational Tempo
PD	Point Detonating
PFED	Portable Forward Entry Device
SADARM	Sense And Destroy Armor Munition
SEAD	Suppression of Enemy Air Defense
SOF	Special Operations Forces
SOP	Standard Operating Procedures
TPP	Tactics Techniques and Procedures
USSOCOM	United States Special Operations Command
VT	Variable Time

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